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1	2	6400352.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 11:51
2	1	6400352.pn. and (audi\$5 sound visual\$4)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 11:54
3	1	6400352.pn. and (audi\$5 sound visual\$4) with (response feedback) with (input mouse mice manipul\$4)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:00
4	89791	(audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:06
5	47118	( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:09
6	14400	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:10
7	68	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)) and ( receiv\$4 generat\$4 provid\$4) with visual with (indicator signal) with (((control input) near device) mouse joystick)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:13
8	106	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)) and ( receiv\$4 generat\$4 provid\$4) with (visual event) with (indicator signal) with (((control input) near device) mouse joystick)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:14
9	0	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)) and ( receiv\$4 generat\$4 provid\$4) with (visual event) with (indicator signal) with (((control input) near device) mouse joystick)) and notify\$5 with user with event with occurred	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:15
10	0	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)) and ( receiv\$4 generat\$4 provid\$4) with (visual event) with (indicator signal) with (((control input) near device) mouse joystick)) and notify\$5 with user with event same occurred	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:15
11	1	(( (audi\$5 sound visual\$4) with (response indicat\$4 signal feedback) same (input mouse joystick mice manipul\$4)) and (modify\$4 alter\$4 chang\$4 ) same (indicat\$4 signal feedback response sound audi\$5 visual\$4)) and generat\$4 with (notification notice message urgent information)) and ( receiv\$4 generat\$4 provid\$4) with (visual event) with (indicator signal) with (((control input) near device) mouse joystick)) and notify\$5 same event same occurred	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:20

12	1636	345/156,163,701,702,158,166,170.ccls. and (control input) near device and (mouse joystick)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:44
13	311	463/30,35,37;340/7.58-7.59,407.1-407.2,815.4.ccls. and ( mouse joystick) and ( control input\$4) near5 device	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:46
14	32	((345/156,163,701,702,158,166,170.ccls. and (control input) near device and (mouse joystick)) (463/30,35,37;340/7.58-7.59,407.1-407.2,815.4.ccls. and ( mouse joystick) and ( control input\$4) near5 device)) and (notify\$4 indicat\$4) with (visual audib\$4 sound) same (control input) near device	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:47
15	56	((345/156,163,701,702,158,166,170.ccls. and (control input) near device and (mouse joystick)) (463/30,35,37;340/7.58-7.59,407.1-407.2,815.4.ccls. and ( mouse joystick) and ( control input\$4) near5 device)) and (notify\$4 indicat\$4) with (visual audib\$4 sound) same (((control input) near device) mouse joystick)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:47
16	10	(((345/156,163,701,702,158,166,170.ccls. and (control input) near device and (mouse joystick)) (463/30,35,37;340/7.58-7.59,407.1-407.2,815.4.ccls. and ( mouse joystick) and ( control input\$4) near5 device)) and (notify\$4 indicat\$4) with (visual audib\$4 sound) same (((control input) near device) mouse joystick)) and generat\$4 with (messag\$4 notice notification indicator)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:49
17	2	(((345/156,163,701,702,158,166,170.ccls. and (control input) near device and (mouse joystick)) (463/30,35,37;340/7.58-7.59,407.1-407.2,815.4.ccls. and ( mouse joystick) and ( control input\$4) near5 device)) and (notify\$4 indicat\$4) with (visual audib\$4 sound) same (((control input) near device) mouse joystick)) and generat\$4 with (messag\$4 notice notification indicator)) and light\$4 with illumin\$5	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/06/05 12:50



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Relevance scale ☐ ☐ ☐ ☐ ☐**1** [Drag-and-drop versus point-and-click mouse interaction styles for children](#)

Kori M. Inkpen

March 2001 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 8 Issue 1
 Full text available: pdf(203.66 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

This research investigates children's use of two common mouse interaction styles, drag-and-drop and point-and-click, to determine whether the choice of interaction style impacts children's performance in interactive learning environments. The interaction styles were experimentally compared to determine if either method was superior to the other in terms of speed, error rate, or user preference, for children. The two interaction styles were also compared based on children's achievement and m ...

**Keywords:** children, computers in education, drag-and-drop, electronic games, gender, input techniques, interaction styles, interface design, mouse interaction, point-and-click

**2** [The audible web: auditory enhancements for Mosaic](#)

Michael C. Albers, Eric Bergman

May 1995 **Conference companion on Human factors in computing systems**
 Full text available: pdf(243.56 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)
**3** [Audio enhanced 3D interfaces for visually impaired users](#)

Stephen W. Mereu, Rick Kazman

January 1997 **ACM SIGCAPH Computers and the Physically Handicapped**, Issue 57
 Full text available: pdf(652.72 KB) Additional Information: [full citation](#), [abstract](#), [index terms](#)


Three dimensional computer applications such as CAD packages are often difficult to use because of inadequate depth feedback to the user. It has, however, been shown that audio feedback can help improve a user's sense of depth perception. This paper describes an experiment which evaluates the use of three different audio environments in a 3D task undertaken by visually impaired users. The three audio environments map tonal, musical, and orchestral sounds to an (x, y, z) position in a 3D environm ...

**Keywords:** 3D interface, auditory interface, disability access, user interface

**4** [Behavioral Aspects of Text Editors](#)

David W. Embley, George Nagy

January 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 1

Full text available:  pdf(3.44 MB)

Additional Information: [full citation](#), [references](#), [citations](#)

## 5 Pressure widgets

Gonzalo Ramos, Matthew Boulos, Ravin Balakrishnan

April 2004 **Proceedings of the 2004 conference on Human factors in computing systems**

Full text available:  pdf(404.08 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Current user interface widgets typically assume that the input device can only provide x-y position and binary button press information. Other inputs such as the continuous pressure data provided by styluses on tablets are rarely used. We explore the design space of using the continuous pressure sensing capabilities of styluses to operate multi-state widgets. We present the results of a controlled experiment that investigates human ability to perform discrete target selection tasks by varying a ...

**Keywords:** isometric input, pen-based interfaces, pressure input, pressure widgets

## 6 Weasel: a computer based system for providing non-visual access to music notation

B. P. Challis, A. D. N. Edwards

January 2000 **ACM SIGCAPH Computers and the Physically Handicapped**, Issue 66


Full text available:  pdf(877.59 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

Although we constantly rely on touch and sound on a daily basis, product designers rarely monopolise the potential for auditory and, in particular, tactile feedback. This is particularly true within computer interface design where there is still a trend to work with highly graphical interfaces using only a mouse and a keyboard for input. This kind of kind of reliance on visual interaction actively prevents blind people from using many common computer applications. At the University of York we ha ...

## 7 JVOX

David G. Smith, Joey K. Tuttle


September 1993 **ACM SIGAPL APL Quote Quad , Proceedings of the international conference on APL**, Volume 24 Issue 1

Full text available:  pdf(728.41 KB) Additional Information: [full citation](#), [index terms](#)

## 8 Full Papers: Navigational blocks: navigating information space with tangible media

Ken Camarata, Ellen Yi-Luen Do, Brian R. Johnson, Mark D. Gross

January 2002 **Proceedings of the 7th international conference on Intelligent user interfaces**

Full text available:  pdf(623.38 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The Navigational Blocks project demonstrates a tangible user interface that facilitates retrieval of historical stories in a tourist spot. Orientation, movement, and relative positions of physical Blocks support visitor navigation and exploration in a virtual gallery. The Navigational Blocks system provides a physical embodiment of digital information through tactile manipulation and haptic feedback. The simple cubic form of the Blocks is easy to understand and therefore easy to use to manipulate ...

**Keywords:** database query, information navigation, tangible interface

**9 Graphic StoryWriter: an interactive environment for emergent storytelling**


Karl E. Steiner, Thomas G. Moher

June 1992 **Proceedings of the SIGCHI conference on Human factors in computing systems**Full text available:  pdf(871.68 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The Graphic StoryWriter (GSW) is an interactive system that enables its users to create structurally complete stories through the manipulation of graphic objects in a simulated storybook. A rule-based story engine manages character and prop interaction, guides story development, and generates text. Through the simple interface and story writing engine, the Graphic StoryWriter provides an environment for early readers to learn about story structures, to experience the relationship between pi ...

**Keywords:** educational software, story grammars, user interaction**10 Audio enhanced 3D interfaces for visually impaired users**

Stephen W. Mereu, Rick Kazman

April 1996 **Proceedings of the SIGCHI conference on Human factors in computing systems: common ground**Full text available:  pdf(992.02 KB) html(26.91 KB)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**Keywords:** 3D interface, auditory interface, disability access, user interface**11 Accesible interfaces: Auditory and tactile interfaces for representing the visual effects on the web**

Chieko Asakawa, Hironobu Takagi, Shuichi Ino, Tohru Ifukube

July 2002 **Proceedings of the fifth international ACM conference on Assistive technologies**Full text available:  pdf(791.55 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we describe auditory and tactile interfaces to represent visual effects nonvisually for blind users, allowing intuitive recognition of visual content that appears on the Web. This research examines how visual effects could be recognized by blind subjects using the senses of hearing and touch, aiming at integrating the results into a practical system in the future. As an initial step, two experiments were performed, one for sonification and tactilization of a page overview based on ...

**Keywords:** auditory interface, blind, nonvisual, sonification, tactile interface, tactilization**12 Human-machine perceptual cooperation**

Francis K. H. Quek, Michael C. Petro

May 1993 **Proceedings of the SIGCHI conference on Human factors in computing systems**Full text available:  pdf(972.26 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The Human-Machine Perceptual Cooperation (HMPC) paradigm combines a human operator's high level reasoning with machine perception to solve spatio-perceptual intensive problems. HMPC defines two channels of interaction: the focus of attention (FOA) by which the user directs the attention of machine perception, and context. As the user moves the FOA across a display via a pointing device, a smart cursor operates proactively on the data, highl ...


**Keywords:** document image analysis, human-computer interaction, map conversion,

shared perception, telerobotics

### 13 A specification language for direct-manipulation user interfaces

Robert J. K. Jacob

October 1986 **ACM Transactions on Graphics (TOG)**, Volume 5 Issue 4

Full text available:  pdf(2.75 MB)


Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A direct-manipulation user interface presents a set of visual representations on a display and a repertoire of manipulations that can be performed on any of them. Such representations might include screen buttons, scroll bars, spreadsheet cells, or flowchart boxes. Interaction techniques of this kind were first seen in interactive graphics systems; they are now proving effective in user interfaces for applications that are not inherently graphical. Although they are often easy to learn and ...

### 14 Learning technologies: Modeling educational software for people with disabilities: theory and practice

Nelson Baloian, Wolfram Luther, Jaime Sánchez

July 2002 **Proceedings of the fifth international ACM conference on Assistive technologies**

Full text available:  pdf(1.15 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


Interactive multimedia learning systems are not suitable for people with disabilities. They tend to propose interfaces which are not accessible for learners with vision or auditory disabilities. Modeling techniques are necessary to map real world experiences to virtual worlds by using 3D auditory representations of objects for blind people and visual representations for deaf people. In this paper we describe common aspects and differences in the process of modeling the real world for application ...

**Keywords:** modeling methodologies, sensory disabilities, tutoring systems, user adapted interfaces

### 15 Section 06: objects in space: ComTouch: design of a vibrotactile communication device

Angela Chang, Sile O'Modhrain, Rob Jacob, Eric Gunther, Hiroshi Ishii

June 2002 **Proceedings of the conference on Designing interactive systems: processes, practices, methods, and techniques**

Full text available:  pdf(4.16 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We describe the design of ComTouch, a device that augments remote voice communication with touch, by converting hand pressure into vibrational intensity between users in real-time. The goal of this work is to enrich inter-personal communication by complementing voice with a tactile channel. We present preliminary user studies performed on 24 people to observe possible uses of the tactile channel when used in conjunction with audio. By recording and examining both audio and tactile data, we found ...

**Keywords:** communication, haptic interpersonal, remote communication, tactile communication, tangible telepresence, tangible user interface, touch-vibration mapping, vibrotactile

### 16 Human-Machine perceptual cooperation

Francis K. H. Quek, Michael C. Petro

January 1993 **Proceedings of the conference on Human factors in computing systems**

Full text available:  pdf(1.03 MB)


Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** document image analysis, human-computer interaction, map conversion, shared perception, telerobotics

17 Capturing, structuring, and representing ubiquitous audio

Debby Hindus, Chris Schmandt, Chris Horner

October 1993 **ACM Transactions on Information Systems (TOIS)**, Volume 11 Issue 4

Full text available:  pdf(1.78 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


Although talking is an integral part of collaboration, there has been little computer support for acquiring and accessing the contents of conversations. Our approach has focused on ubiquitous audio, or the unobtrusive capture of speech interactions in everyday work environments. Speech recognition technology cannot yet transcribe fluent conversational speech, so the words themselves are not available for organizing the captured interactions. Instead, the structure of an int ...

**Keywords:** audio interactions, collaborative work, multimedia workstation software, semi-structured data, software telephony, stored speech, ubiquitous computing

18 Issues and techniques in touch-sensitive tablet input

William Buxton, Ralph Hill, Peter Rowley

July 1985 **ACM SIGGRAPH Computer Graphics , Proceedings of the 12th annual conference on Computer graphics and interactive techniques**, Volume 19 Issue 3

Full text available:  pdf(3.13 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Touch-sensitive tablets and their use in human-computer interaction are discussed. It is shown that such devices have some important properties that differentiate them from other input devices (such as mice and joysticks). The analysis serves two purposes: (1) it sheds light on touch tablets, and (2) it demonstrates how other devices might be approached. Three specific distinctions between touch tablets and one button mice are drawn. These concern the signaling of events, multiple point s ...

**Keywords:** touch sensitive input devices

19 Nomadic radio: speech and audio interaction for contextual messaging in nomadic environments

Nitin Sawhney, Chris Schmandt

September 2000 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 7 Issue 3

Full text available:  pdf(648.76 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Mobile workers need seamless access to communication and information services while on the move. However, current solutions overwhelm users with intrusive interfaces and ambiguous notifications. This article discusses the interaction techniques developed for Nomadic Radio, a wearable computing platform for managing voice and text-based messages in a nomadic environment. Nomadic Radio employs an auditory user interface, which synchronizes speech recognition, speech synthesis, nonspeech audio ...

**Keywords:** adaptive interfaces, contextual interfaces, interruptions, nonspeech audio, notifications, passive awareness, spatial listening, speech interaction, wearable computing

20

Towards usable VR: an empirical study of user interfaces for immersive virtual

environments

Robert W. Lindeman, John L. Sibert, James K. Hahn

May 1999 **Proceedings of the SIGCHI conference on Human factors in computing systems: the CHI is the limit**

Full text available:  [pdf\(1.25 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** 3D user interfaces, bimanual interaction, passive-haptic feedback, virtual environments, virtual reality

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